

## NOTES BY THE EDITOR.

## A PROPOSED METEOROLOGICAL COMMISSION.

A letter recently received by the Chief of the Weather Bureau from a distinguished citizen in Council Bluffs, Iowa, contains a proposition that may be best explained by the following quotation:

In view of the repeated calamities visited upon the farmers and business men of the country by reason of drought and their lack of knowing the laws of nature, why would it not be for the best, to appoint a commission of experts to investigate and formulate a system by which a foreknowledge of the seasons can be obtained, and the information diffused regularly hereafter, so that the farmers will know what to plant and sow, and thus save themselves from such calamities as we are now experiencing? \* \* \* It is useless, it is criminal to say such a system can not be formulated. Years of study and investigation have convinced me that it can. I have sought no publicity in such matters because I am only a plain citizen who has been humbly doing all the good he could for his fellows. The ancient students of meteorology had this knowledge, and as the same laws are still existing, and as progressive men have knowledge of their workings, there is no reason why they should not be utilized for the benefit of mankind. Calling such men "cranks," "charlatans" and other epithets does no good, and does not alter one law of nature. Philanthropists never talk that way, but investigate and put truths in active force for the public blessing. \* \* \* I have mentioned these men because they are experts, although in some cases of opposing schools. Yet they are possessed of sufficient charity and intelligence to agree upon mutual concessions and formulate a system that will do away with the misery experienced by the unfortunate in these recurring famines, whose effect, under such a system can, as I believe, be materially ameliorated if backed by the authority and dignity of this Government.

The reply of the Chief of the Bureau to the above letter emphasizes some points that are, perhaps, apt to be forgotten by the public at large, and we venture to make the following extract, which clearly defines his own convictions and expresses the general consensus of opinion among all throughout the world who have a right to be called meteorologists.

While recognizing the incalculable value of a foreknowledge of seasonable weather conditions, I am not prepared to concur in your belief regarding the possibilities of acquiring this knowledge, or accept your estimate of the knowledge possessed by the ancient students of meteorology. The Egyptians and Greeks conducted a system of observations, and determined by the transit of the stars, and the rising of the constellations the march of the various seasons suitable for agriculture or for the irrigation of lands. The Egyptians also had gages to accurately note the height of the Nile, and by the flow of that river, and by its height or lowness at certain seasons, they calculated whether flood or drought would follow. For, upon the height of the Nile depended the success or failure of the coming harvest time. The meteorological knowledge of the ancients was, so far as history shows, limited to a knowledge of the effects of visible conditions. Thus, when the Nile watered the agricultural districts of Egypt, good harvests followed; when the Nile was low the fields were dry and a season of dearth followed. \* \* \* Modern meteorological knowledge has been acquired during the last century, and it is certain that prior to the year 1820, when Redfield announced his discovery of the laws of storms, the scientific world possessed no definite knowledge of the laws which govern the movements of the atmosphere, and which control its various phenomena. \* \* \* It is believed that the Weather Bureau of the Department of Agriculture is thoroughly familiar with all meteorologic knowledge, both ancient and modern, and that every legitimate effort is being made by that Bureau to acquire a foreknowledge of the weather which will be useful to farmers in seasons of planting and harvesting.

The subject of seasonable weather forecasting is receiving special attention, and all lines of investigation which are calculated to establish laws which control future weather conditions are being exhaustively followed. That these investigations may be successful, is the earnest wish of every modern student of meteorology.

The above correspondence suggests a few additional thoughts which may be worth publishing if thereby we may allay any uneasiness in the minds of those whose property in crops and cattle is frequently destroyed or threatened with destruction by droughts and floods, winds and lightning. Previous to

November 1, 1870, the citizens of the United States, rarely recognized the possibilities of foreseeing the weather twenty-four hours in advance with any greater certainty than that attained by the local wisdom of the oldest residents. On that date they awoke from this dream of ignorance and began to dimly comprehend the fact that by persistent study, if the proper data are at hand, man will be able to predict the weather to a certain limited degree of refinement. Since that day the Weather Bureau has made some progress and is probably now doing all that can be done with the available data. In order to do better, we need on the one hand daily weather maps, covering a broader extent of continents and oceans, and similar maps for the upper regions of the atmosphere, such as can only be furnished by the use of kites, balloons, and mountain stations. On the other hand, we need a much more profound investigation of the mechanical problems involved in the motions of the atmosphere than has as yet been possible for man to execute. There is a limit to what any man or any generation of men can accomplish. We are always building upon the foundations that have been laid by our predecessors. Occasionally a genius strikes out on some wholly new plan of operations and then the world of science takes a new start. The progress of knowledge since the days of Aristotle may be divided into periods marked by the advent of such men as Copernicus, Galileo, Newton, Fourier, Gauss, Helmholtz, Riemann, and Maxwell. The progress of meteorology is due to the devotion of such men as Redfield, Espy, and Ferrel, among the dead, and Hann, Mohn, von Bezold, Mascart, Eliot, Wild, and Neumayer, among the living. A host of names of other active workers might be mentioned, but these men and their assistants have solved some of the difficult problems that beset the path of progress, and it is by a continuance of such work as they have done that we must expect final success. We are one with the farmers and business men of the country in their desire to hasten the progress of our knowledge by the discovery of unknown laws of nature, but they must not expect these laws to be written out in such plain terms that a "commission of experts" can "formulate a system by which a foreknowledge of the seasons can be obtained, so that the farmers will know what to plant and sow." It is not likely that the simplest rational system of weather prediction could be easily handled by the farmer. The latter now gets his knowledge of the astrological predictions from the farmer's almanacs which are for sale everywhere in this country and Europe. If the farmers wish anything better than these they must for the present be content with those that are published by the official weather bureaus of every civilized country.

There is no nation that does not now maintain a system of telegraphic reports of the weather and daily predictions carefully compiled therefrom. These forecasts for the coming day, or two days, represent the best thought of conservative students who would not publish a prediction that has not nine chances out of ten in favor of its verification.

As a matter of fact, every national government weather bureau in the world has in its employ one or more experts whose thoughts are given principally to the improvement of its methods and especially the invention of some satisfactory method of long range forecasts or general predictions of the character of the seasons one month or six months or even a year in advance. It is well known that in this matter of seasonal forecasts the meteorological reporters for the government of India, Mr. Blanford and Mr. John Eliot, and their assistant, Mr. William Dallas, have thus far taken the lead. They have, in fact, experienced but one serious failure in the

last fifteen years in the forecast of monsoon rains. Their methods are very special, adapted only to India, and not applicable to the United States. Doubtless equally good methods will be invented to meet the necessities of American farmers, but these will almost certainly not be devised by a mixed commission of astronomers and inventors and astrologists, such as those specifically suggested by the author of the above letter. It is to some one man that we must look, one who shall patiently study the subject in the light of a complete knowledge of the mechanics of the earth's atmosphere—just as La Place advanced astronomy by his exhaustive knowledge of celestial mechanics. A commission or committee often serves a good purpose in collecting data or suggesting problems for others to work upon, or in stimulating the best efforts of ambitious students, but we do not know of a single case in which such a commission has itself successfully investigated an abstruse problem, such as that offered by the atmosphere. An investigation in an almost untrodden field can best, and we may say only, be carried out by one individual. He may have many assistants to do the computing, the searching, and the humdrum mathematical work, but his own clear thought must dominate the whole.

In so far as the problems of meteorology can be resolved by study, progress will be best accomplished by the help of a so-called meteorological laboratory or a school of meteorology, established in connection with some one of our universities, in which special attention is paid to the mechanics of the atmosphere with its attending physics and mathematics. Analogous laboratories and observatories in Europe have given us all the knowledge that modern science possesses of astronomy, chemistry, physics, physiology, and electricity. Galileo's wisdom was communicated to the world through his experimental work and lectures at the universities of Florence, Padua, and Pisa. The universities of France, Germany, and England have developed those who add to knowledge as distinguished from those who teach and those who apply. The investigator, the teacher, and the inventor has each his own work to do. We have at present in this country not a single university where meteorology is studied and taught as a branch of applied physics and mathematics. Our most eminent Ferrel, the founder of modern meteorology, was always a Government employee and was deprived of the great stimulus that comes from daily association with post graduate students. Even European universities have but lately given the modern dynamic meteorology its proper rank alongside of astronomy, mathematics, and electricity, and above the old fashioned statistical climatology. Nothing stimulates a man of thought more than the consciousness that ambitious students are following him in his investigations and will take up the thread of study where he lays it down. Ninety-nine per cent of the beautiful and important investigations annually published by the young candidates for scientific honors in American and foreign universities are but the development of ideas awakened in the student and disciple by the deeper thought of the master. Happy the youth who studies under such masters. Happy the university that is wise enough to keep such men in its faculty.

The author of the above letter from Council Bluffs says that "years of study and investigation have convinced him that a system can be formulated by which a foreknowledge of the seasons can be obtained." We quite agree with him as to this conclusion, because, on general principles, we believe that the gradual increase in knowledge and the development of the intellect of man will give him a complete insight into nature's laws. Not that we can change the laws, but that we can understand them and use them. Our conclusion is not based upon special study and investigation so much as it is upon a general philosophic survey of the progressive in-

tellectual development of Europe, and our readers will be glad to know in detail the arguments and investigations that have brought our correspondent to his conclusion.

It has always seemed to the Editor very strange that so many are inclined to attribute to the ancients a perfection in civilization and knowledge greater or even as great as that which we enjoy at the present day. During the past century, one may often meet in literature with the expression "the lost arts," as though something that could be of value to us had been known long ago but is now irrecoverably lost. We very much doubt the truth of this proposition. In the present case we certainly have no evidence whatever that the ancient students of meteorology had a knowledge that would enable them to make seasonable forecasts of the weather at all comparable with those that are called for at the present time. We do know, in a general way, that the Chaldeans supported a priestly class who studied the stars, probably also the atmosphere, and predicted future events in the lives of men by means of astrological rules. Some fragments of their knowledge are being translated for us from the cuneiform inscriptions of Babylon, Nineveh, Erech, and other cities whose ruins have fortunately been preserved. The documents that have thus far been translated reveal a state of civilization and a social organization adapted to the needs of those nations but in no way superior to what we ourselves enjoy at the present day. This Chaldean system of observation and investigation doubtless continued for several hundred years, yet it had not in it that spirit of progress which marks the present civilization of Europe and America. We hope, indeed, that documents will be discovered showing that the priests had arrived at some important meteorological generalizations; yet this is only a hope; nothing of the kind has as yet been found out, nor any indication that it ever existed. The Chaldean meteorology, even if it were preserved to us complete, would probably be as barren of valuable results as are the voluminous records that have been preserved in China and India for the past two or three thousand years. The art of investigating nature, and of determining the exact phraseology of her laws, and the art of applying this knowledge to the daily needs of mankind, is almost wholly the creation of modern times, beginning with Galileo and Newton. We shall not draw any inspiration from the ancients. The future growth of meteorology must be founded upon the study of mathematics, mechanics, and physics, as taught in the scientific schools of modern universities. Our author pleads for fair treatment of those who are called "cranks," "charlatans," "astrologers," etc., whom de Morgan calls "paradoxers"; but these are the very ones who have nothing to do with modern science. They are to science what the anarchists are to society. They can not reconcile themselves to the world as it is, and are content to live in a dreamland where matters are arranged very differently from what they are on this earth. Common sense demands that we who live on the earth should abide by the laws that regulate this material world.

In the last portion of his letter, our correspondent says that the experts mentioned by him, and representing opposing schools of astronomy and astrology, "are possessed of sufficient charity and intelligence to agree upon mutual concessions and to formulate a system that will do away with the misery experienced by the unfortunate in these recurring famines." But does the country really want a system of weather predictions based on "mutual concessions" by the wrangling representatives of opposing schools? What have their "mutual concessions" to do with the laws of nature? Do we not rather want a system based upon the natural facts and laws, unbiased by human theories? Would it not be just as well for the opposing schools, each by itself, to formu-

late its own system, if it has any, and give us a chance to see whether either is at all satisfactory as a basis of long-range forecasting? The Weather Bureau is not so wedded to the daily weather map, with its clear presentation of the actual state of affairs and the general drift of the weather for the next few days, but what it would quickly adopt the horoscopes of the astrologer or the cycles of the empiricists if there were the least chance of doing anything with these methods more satisfactory than is being done at the present time. It can not be too strongly stated that up to the present time no man has yet appeared who has shown himself able to deduce all the consequences in weather and climate that flow from the action of the sun's heat upon the earth, the ocean, and the clouds, and until that has been accomplished the study of the infinitesimal influences of the sun spots, the moon, the planets, and the stars, is wholly uncalled for and irrational.

#### UNIVERSITY RESEARCH AT WASHINGTON, D. C.

The proceedings of the last Convention of Agricultural Colleges and Experiment Stations held in November, 1900, have lately been published as Bulletin No. 99 of the Office of Experiment Stations. There are a number of addresses and discussions that will undoubtedly interest those Government officials who are hoping for the broadest development of university education in order that the various departments may secure the highest type of men to carry on the scientific work of the Government. The committee on graduate study at Washington pointed out the great stimulus that has been given to this subject by the appointment of "scientific aids in the Department of Agriculture," whose term of service is at present limited to two years, and whose maximum compensation is \$40 per month or sufficient to cover a portion of the living expenses, while the young men who must be graduates of land grant colleges have an opportunity to show what they can do in the way of original research in lines of work that are important to the Department.

The discussion as to the propriety of establishing a national university or a Washington memorial at the capital has also taken a prominent place at the July convention of the National Educational Association in Detroit, and it has also been brought prominently forward by the Chicago address of the Director of the United States Geological Survey, Dr. C. H. Walcott. Apparently all the practical agitators of this subject are in accord with the ideas published in the *MONTHLY WEATHER REVIEW*,<sup>1</sup> to the effect that the Government has already long since established its land grant colleges representing in general the under graduate or collegiate department of the proposed national university. It has now only to co-ordinate the systems of instruction in these colleges by the appointment of a board which may very properly be called the regents of the university. It can then authorize these regents to establish the conditions under which graduates from these, and probably other institutions, may continue their studies in Washington and attain the higher or university degree. In this latter portion of the work the investigators and the laboratories, the museums and the libraries, the literary and legal authorities in the employ of the Government can be utilized, but, of course, many additional facilities must be provided.

The fact that there is often a demand for a man who can do original work rather than for one who knows all about

what others have done, suggests that there should be an intimate relation and friendly cooperation between such a national university and the Civil Service Commission.

The address by President Stubbs of Nevada, and especially that of J. K. Patterson, contained in the above-mentioned Bulletin No. 99, emphasize the necessity of a systematic co-ordination of the courses of study.

#### INSTRUCTIONS TO THE VOLUNTARY METEOROLOGICAL OBSERVERS OF THE UNITED STATES HYDROGRAPHIC OFFICE.

Under the above title a pamphlet by Mr. James Page, Meteorologist to the Hydrographic Office, has just been published from which we make the following extracts which show the work being done at the Hydrographic Office in charting the weather from day to day in response to the demands of modern meteorology, as well as the tabulation of the data for use in preparing monthly and annual means.

We notice that on page 26 mariners are instructed not to apply the reduction to standard gravity when they use mercurial barometers, but that they may apply an inverse correction to the aneroid. This seems to be exactly contrary to the recommendations of all the international meteorological conferences. Our own experience is that at sea the aneroid is quite as reliable as the mercurial, and of course it needs no correction for gravity.

In the days of Maury, and for some years subsequent to the period of his greatest activity, the common aim of the various institutions engaged in the study of ocean meteorology was to obtain for each unit area of the sea's surface (generally a field bounded by the even 5° parallels and meridians, 5°, 10°, 15°, etc.) a reasonable number of observations of wind, weather, etc., extending over any period of years. The observations were then assembled by months, the average for each month taken, and the result stated as the normal condition for the month, i. e., the condition which the mariner might expect to find most frequently prevailing throughout the given field or square during the given month. Sailing routes were then laid down for the successive months in accordance with these normal conditions, and shipmasters were instructed to adhere to these routes as rigidly as the winds would permit, even when convinced by their own experience of weather changes, as well as by the indications of their meteorological instruments, that better results might be attained by adapting the course of the voyage to the conditions actually encountered.

With the advent of weather forecasting as a science, using as a basis the daily synoptic weather charts, a new importance was attached to the sailor's meteorological observations. It was seen that in taking them he was not only adding to the stock of general knowledge of the climatology of the sea, the value of which to him was future and problematical, but also that he was putting himself in possession of certain special knowledge the value of which might prove absolute and immediate. His last preceding observation revealed a certain existent condition of the meteorological elements, his present observation a more or less different condition. What did the changes which had taken place during the time intervening between the observations foretell? Did the existence of adverse winds in his immediate neighborhood imply better or worse conditions elsewhere? If better, would he not, in this instance be justified in abandoning the route which had been laid down for him as the best under average circumstances, and seeking that which his present observations led him to believe would prove more favorable?

A satisfactory answer to these various questions demands, in addition to a knowledge of the general periodic changes which occur in the several meteorologic elements from season to season, and from month to month, a knowledge of what may be termed the nonperiodic or accidental changes which occur from day to day; of the relation which exists between the simultaneous changes in the several elements and of the effect which a decided variation of pressure, temperature, or wind in any one neighborhood has upon the conditions existing in other parts of the ocean.

To obtain this latter knowledge it is requisite that we have at hand for the purpose of study a series of charts or pictures, as it were, of the weather covering the entire ocean at a given instant of time, taken at regular intervals so brief that we may be confident that no marked change can occur without appearing in its different stages upon several of the pictures in succession. An examination of this series will then serve to reveal what changes have taken place in the interval separating any two of them; to trace the development and progress of any

<sup>1</sup> *MONTHLY WEATHER REVIEW*: February, 1898, pp. 63-64; Civil service examinations. December, 1898, p. 548; Civil service examinations for observers in the Weather Bureau. December, 1898, p. 564; Civil service examinations for assistants in the Department of Agriculture. May, 1899, p. 213; Scientific aids in the Department of Agriculture.